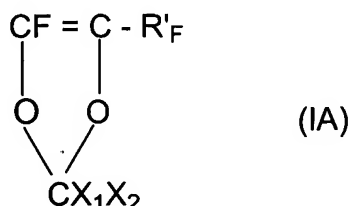


**AMENDMENT TO THE CLAIMS:**

Claim 1. (Withdrawn and Currently Amended) Amorphous perfluorinated homopolymers and copolymers of perfluorodioxoles of formula (IA):



wherein  $\text{R}'_{\text{F}}$  is equal to  $\text{R}_{\text{F}}$  or  $\text{OR}_{\text{F}}$  wherein  $\text{R}_{\text{F}}$  is a linear or branched perfluoroalkyl radical having 1-5 carbon atoms, preferably  $\text{R}'_{\text{F}} = \text{OCF}_3$ ;  $\text{X}_1$  and  $\text{X}_2$ , equal to or different from each other, are F,  $\text{CF}_3$ ;  
having a dioxole content  $\geq 95\%$  by moles, having the following combination of properties:

- $T_g$ , measured according to the ASTM 3418 (DSC) method, from  $180^\circ\text{C}$  to  $195^\circ\text{C}$ , preferably from  $190^\circ\text{C}$  to  $192^\circ\text{C}$ ;
- intrinsic viscosity, measured at the temperature of  $30^\circ\text{C}$  in perfluoroheptane (Galden<sup>®</sup> D80) according to the ASTM D 2857-87 method, from 13 cc/g to 100 cc/g.

Claim 2. (Withdrawn) Amorphous perfluorinated polymers according to claim 1, wherein in formula (A)  $\text{R}'_{\text{F}} = \text{OCF}_3$ ;  $\text{X}_1 = \text{X}_2 = \text{F}$  (TTD).

Claim 3. (Withdrawn) Polymers according to claim 1, selected among the homopolymers of the perfluorodioxole of formula (IA) wherein  $\text{R}'_{\text{F}} = \text{OCF}_3$ ;  $\text{X}_1 = \text{X}_2 = \text{F}$ .

Claim 4. (Withdrawn and Currently Amended) Amorphous perfluorinated polymers according to claim 1, wherein the comonomers are selected from one or more of the following:

- C<sub>2</sub>-C<sub>8</sub> perfluoroolefins, selected between tetrafluoroethylene (TFE), hexafluoropropene (HFP);
- perfluoroalkylvinylethers (PAVE) CF<sub>2</sub> = CFOR<sub>f</sub>, wherein R<sub>f</sub> is a C<sub>1</sub> – C<sub>6</sub> perfluoroalkyl, ~~preferably CF<sub>3</sub>, C<sub>2</sub>F<sub>5</sub>, C<sub>3</sub>F<sub>7</sub>;~~
- perfluoro-oxyalkylvinylethers CF<sub>2</sub> = CFOX, wherein X is selected from the group consisting of: [[a]] C<sub>1</sub> – C<sub>12</sub> alkyl, [[or a]] C<sub>1</sub> – C<sub>12</sub> oxyalkyl, [[or a]] and C<sub>1</sub> – C<sub>12</sub> (per)fluoro-oxyalkyl having one or more ether groups, preferably perfluoro-2-propoxy-propyl;
- perfluorodioxoles, wherein in formula (IA) instead of R'<sub>F</sub> there is one F atom; X<sub>1</sub> and X<sub>2</sub>, equal to or different from each other, are selected between F or R<sub>F</sub>; preferably X<sub>1</sub> = X<sub>2</sub> = CF<sub>3</sub>;
- perfluorovinylethers (MOVE) of general formula CFX<sub>AI</sub> = CX<sub>AI</sub>OCF<sub>2</sub>OR<sub>AI</sub> (A-I) wherein:
  - R<sub>AI</sub> is selected from the group consisting of: a C<sub>2</sub> – C<sub>6</sub> linear, branched perfluoroalkyl group, a [[or]] C<sub>5</sub> – C<sub>6</sub> cyclic perfluoro oxyalkyl group, [[or]] and a C<sub>2</sub> – C<sub>6</sub> linear or branched perfluoro oxyalkyl group containing from one to three oxygen atoms;  
R<sub>AI</sub> can optionally contain from 1 to 2 atoms, equal or different, selected from the following: Cl, Br, I;
  - X<sub>AI</sub> = F;  
~~the compound (MOVE I) CF<sub>2</sub> = CFOCF<sub>2</sub>OCF<sub>2</sub>CF<sub>3</sub> and (MOVE II) CF<sub>2</sub> = CFOCF<sub>2</sub>OCF<sub>2</sub>CF<sub>2</sub>OCF<sub>3</sub> are preferred.~~

Claim 5. (Withdrawn and Currently Amended) A polymerization process to obtain amorphous perfluorinated polymers according to claim 1, carried out in emulsion, suspension or microemulsion wherein the reaction temperature is lower than 60°C, ~~preferably from 30°C to 50°C,~~ and in the used reactor the reaction mixture is not in contact with metal surfaces.

Claim 6. (Withdrawn) A process according to claim 5 carried out in microemulsion.

Claim 7. (Withdrawn and Currently Amended) A process according to claim 5, wherein a polymerization reactor is used, coated inside with glass or with inert materials, selected among enamels or fluorinated polymers, preferably PTFE, MFA, PFA, FEP, PCTFE.

Claim 8. (Withdrawn) A process according to claim 5, wherein the reactor is of glass.

Claim 9. (Withdrawn and Currently Amended) Amorphous perfluorinated polymers of claim 1, wherein the ionic end groups are completely absent when determined by the analytical method described hereunder, said polymers obtainable by treating with elemental fluorine, optionally in admixture with inert gases, in an inert solvent at fluorination, in the presence of ultraviolet radiations having a wave length from 200 to 500 nm, operating at temperatures lower than 100°C for reaction times from 10 h to 60 h;

the method used to determine the substantial absence of unstable ionic end groups being carried out by Fourier Transform IR spectroscopy by Nicolet® Nexus FT-IR equipment (256 scanings, resolution 2 cm<sup>-1</sup>), by using a sintered polymer powder pellet having a diameter of 5 mm and a thickness from 50 to 300 micron (1.75 – 10.5 mg of polymer) initially carrying out a scanning between 4000 cm<sup>-1</sup> and 400 cm<sup>-1</sup>, then by maintaining the pellet for 12 hours in an environment saturated with ammonia vapours and then recording the IR spectrum under the same conditions of the initial spectrum; by elaborating the two spectra by subtracting from the signals of the spectrum related to the untreated specimen (starting spectrum) the corresponding signals of the specimen spectrum after exposure to ammonia vapours, obtaining the "difference" spectrum, which is normalized by the following equation:

$$\frac{\text{"Difference spectrum"}}{\text{[pellet weight (g)/pellet area (cm}^2\text{)]}}$$

by measuring the optical densities related to the COOH and COF end groups after the reaction with the ammonia vapours, end groups giving rise with this reaction to detectable peaks; converting the optical densities into mmoles/kg of polymer by using the extinction coefficients reported in Table 1, page 73 of the publication by M. Pianca *et al.* "End groups in fluoropolymers", J. Fluorine Chem. 95 (1999), 71-84 (herein incorporated by reference); in the spectrum of the polymers obtained by fluorination of homopolymers or copolymers of the dioxoles of formula (IA) prepared by the process according to the present invention, in correspondence of the wave length fields 3600-3500 and 1820-1770  $\text{cm}^{-1}$  (COOH group peaks) and 1900-1830  $\text{cm}^{-1}$  (COF groups), there are no peaks distinguishable from the irregularities of the IR spectrum base line.

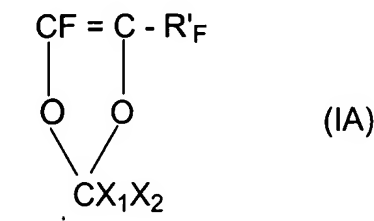
Claim 10. (Withdrawn) Amorphous perfluorinated polymers according to claim 9, wherein the unstable ionic end groups are COF, COOH, their esters, salts or amidic derivatives.

Claim 11. (Withdrawn and Currently Amended) Amorphous perfluorinated polymers according to claim 9, wherein the radiation used in the fluorination process has a wave length ranging from 200 to 500 nm and the reaction temperature ranges from 0°C to +100°C, preferably from +20°C to +50°C.

Claim 12. (Withdrawn) Amorphous perfluorinated polymers according to claim 9, wherein in the fluorination process the polymer concentration in the solvent is between 1 and 10% by weight.

Claim 13. (Withdrawn Currently Amended) Amorphous perfluorinated polymers according to claim 9, wherein a perfluorinated solvent is used, selected from perfluoroalkanes, perfluoropolyethers, preferably having a boiling point lower than 200°C, tertiary perfluoroamines.

Claim 14. (Previously Presented) Use of the A method of preparing coatings wherein amorphous perfluorinated polymers and copolymers of perfluorodioxoles of the following formula (IA) are used according to claim 1, to prepare coatings



wherein  $\text{R}'_{\text{F}}$  is equal to  $\text{R}_{\text{F}}$  or  $\text{OR}_{\text{F}}$  wherein  $\text{R}_{\text{F}}$  is a linear or branched perfluoroalkyl radical having 1-5 carbon atoms;  $\text{X}_1$  and  $\text{X}_2$ , equal to or different from each other, are F,  $\text{CF}_3$ ;

said fluorinated polymers and copolymers having

- a dioxole content  $\geq 95\%$  by moles, having the following combination of properties:
- T<sub>g</sub>, measured according to the ASTM 3418 (DSC) method, from 180°C to 195°C;
- intrinsic viscosity, measured at the temperature of 30°C in perfluoroheptane according to the ASTM D 2857-87 method, from 13 cc/g to 100 cc/g.
- in their IR spectrum in correspondence of the wave length fields 3600-3500 and 1820-1770  $\text{cm}^{-1}$  (COOH groups peaks) and 1900-1830  $\text{cm}^{-1}$ .

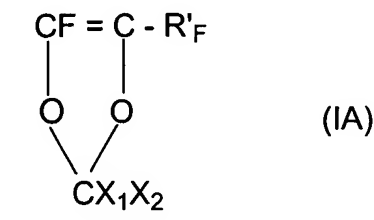
Claim 15. (Currently Amended) Use of the A method of preparing coatings according to claim 14, wherein the coatings are for optical applications in their IR field from 600 to 1800 nm and the amorphous perfluorinated polymers and copolymers of perfluorodioxoles according to claim 9 for optical applications in the IR field from 600 to 1800 nm, preferably 1300 nm — 1500 nm are obtained by treating elementary fluorine, optionally in admixture with inert gases, in an solvent inert to fluorination, in the

presence of ultraviolet radiations having a wave length from 200 to 500 nm and operating at temperatures lower than 100°C for reaction times from 10 h to 60 h.

Claim 16. (Currently Amended) [[Use]] A method of preparing coatings according to claim 15, wherein the intrinsic viscosity of the used amorphous polymers, measured at the temperature of 30°C in perfluoroheptane (Galden® D80) according to the ASTM D 2857-87 method, is comprised between 15 cc/g and 70 cc/g, preferably between 17 cc/g and 50 cc/g.

Claim 17. (Currently Amended) [[Use]] A method of preparing coatings according to claim 15, wherein amorphous perfluorinated polymers of the perfluorodioxole of formula (IA) wherein  $R'_F = OCF_3$ ;  $X_1 = X_2 = F$ , are used.

Claim 18. (Currently Amended) Use of A method of preparing films and membranes for gas separation wherein amorphous perfluorinated polymers according to claim 1 to prepare films and membranes for the gas separation and copolymers of perfluorodioxoles of the following formula (IA) are used:



wherein  $R'_F$  is equal to  $R_F$  or  $OR_F$  wherein  $R_F$  is a linear or branched perfluoroalkyl radical having 1-5 carbon atoms;  $X_1$  and  $X_2$ , equal to or different from each other, are F,  $CF_3$ ;

said fluorinated polymers and copolymers having a dioxole content  $\geq 95\%$  by moles, having the following combination of properties:

- $T_g$ , measured according to the ASTM 3418 (DSC) method, from 180°C to 195°C;

- intrinsic viscosity, measured at the temperature of 30°C in perfluoroheptane according to the ASTM D 2857-87 method, from 13 cc/g to 100 cc/g.

Claim 19. (Currently Amended) [[Use]] A method of preparing films and membranes for gas separation according to claim 18, wherein the intrinsic viscosity of the used amorphous polymers, measured at the temperature of 30°C in perfluoroheptane (~~Golden® D80~~) according to the ASTM D 2857-87 method, ranges from 20 cc/g to 100 cc/g, ~~more preferably from 40 cc/g to 80 cc/g.~~

Claim 20. (Currently Amended) [[Use]] A method of preparing films and membranes for gas separation according to claim 18, wherein amorphous perfluorinated polymers of the perfluorodioxoles of formula (IA) wherein  $R'_F = OCF_3$ ;  $X_1 = X_2 = F$ , are used.

Claim 21 (New) The method according to claim 14 or 18, wherein  $R'_F = OCF_3$ .

Claim 22 (New) The method according to claim 14 or 18, wherein  $T_g$ , measured according to the ASTM 3418 (DSC) method is from 190°C to 192°C.

Claim 23 (New) The method according to claim 14 or 18, wherein in formula (IA),  $R'_F = OCF_3$ ;  $X_1 = X_2 = F$  (TTD).

Claim 24 (New) The method according to claim 14 or 18, wherein the amorphous perfluorinated homopolymers and copolymers further comprise comonomers selected from one or more of the following:

- C<sub>2</sub>-C<sub>8</sub> perfluoroolefins, selected between tetrafluoroethylene (TFE), hexafluoropropene (HFP);
- perfluoroalkylvinylethers (PAVE)  $CF_2 = CFOR_f$ , wherein  $R_f$  is a C<sub>1</sub> – C<sub>6</sub> perfluoroalkyl;

- perfluoro-oxyalkylvinylethers  $CF_2 = CFOX$ , wherein X is selected from: a  $C_1 - C_{12}$  alkyl,  $C_1 - C_{12}$  oxyalkyl, and  $C_1 - C_{12}$  (per)fluoro-oxyalkyl having one or more ether groups;
- perfluorodioxoles, wherein in formula (IA) instead of  $R'_F$  there is one F atom;  $X_1$  and  $X_2$ , equal to or different from each other, are selected between F or  $R_F$ ;
- perfluorovinylethers (MOVE) of general formula  $CFX_{AI} = CX_{AI}OCF_2OR_{AI}$  (A-I) wherein:
  - $R_{AI}$  is selected from: a  $C_2 - C_6$  linear, branched perfluoroalkyl group, a  $C_5 - C_6$  cyclic perfluoro oxyalkyl group, and a  $C_2 - C_6$  linear or branched perfluoro oxyalkyl group containing from one to three oxygen atoms;  $R_{AI}$  can optionally contain from 1 to 2 atoms, equal or different, selected from the following: Cl, Br, I;
  - $X_{AI} = F$ .

Claim 25 (New). A method according to claim 14 or 18, wherein the comonomers are perfluoroalkylvinylethers (PAVE)  $CF_2 = CFOR_f$ , wherein  $R_f$  is  $CF_3$ ,  $C_2F_5$ , or  $C_3F_7$ .

Claim 26 (New). A method according to claim 14 or 18, wherein the comonomers are perfluoro-oxyalkylvinylethers  $CF_2 = CFOX$ , wherein X is perfluoro-2-propoxy-propyl.

Claim 27 (New). A method according to claim 14 or 18, wherein the comonomers are perfluorodioxoles, wherein in formula (IA) instead of  $R'_F$  there is one F atom and  $X_1 = X_2 = CF_3$ .

Claim 28 (New). A method according to claim 14 or 18, wherein the comonomers are perfluorovinylethers (MOVE I)  $CF_2 = CFOCF_2OCF_2CF_3$  or (MOVE II)  $CF_2 = CFOCF_2OCF_2CF_2OCF_3$ .

Claim 29 (New). A method according to claim 15, wherein the unstable ionic end groups are COF, COOH, their esters, salts or amidic derivatives.



Claim 30 (New). A method according to claim 15, wherein the radiation used in the fluorination process has a wave length ranging from 200 to 500 nm and the reaction temperature ranges from 0°C to +100°C.

Claim 31 (New). A method according to claim 15, wherein the radiation used in the fluorination process has a wave length ranging from 200 to 500 nm and the reaction temperature ranges from +20°C to +50°C.

Claim 32 (New). A method according to claim 15, wherein in the fluorination process, the polymer concentration in the solvent is between 1 and 10% by weight.

Claim 33 (New). A method according to claim 15, wherein a perfluorinated solvent is used, selected from perfluoroalkanes and perfluoropolyethers.

Claim 34 (New). A method according to claim 15, wherein a perfluorinated solvent is used, selected from perfluoroalkanes and perfluoropolyethers having a boiling point lower than 200°C.

Claim 35 (New). A method according to claim 15, wherein a perfluorinated solvent is used, selected from tertiary perfluoroamines.

Claim 36 (New). A method of preparing coatings according to claim 15, wherein the coatings are for optical applications in their IR field from 1300 to 1500 nm.

Claim 37 (New). A method of preparing coatings according to claim 15, wherein the intrinsic viscosity of the used amorphous polymers, measured at the temperature of 30°C in perfluoroheptane according to the ASTM D 2857-87 method, is comprised between 17 cc/g and 50 cc/g.